



# Residential electricity consumption after the reform of tiered pricing for household electricity in China



Gang Du<sup>a</sup>, Wei Lin<sup>b</sup>, Chuanwang Sun<sup>c,\*</sup>, Dingzhong Zhang<sup>d,\*</sup>

<sup>a</sup> Department of Business Management, School of Business, East China Normal University, 500 Dongchuan Road, Shanghai 200241, China

<sup>b</sup> School of Economics, Renmin University of China, Beijing 100872, China

<sup>c</sup> Collaborative Innovation Center for Energy Economics and Energy Policy, School of Economics, Xiamen University, Xiamen, Fujian 361005, China

<sup>d</sup> School of Economics, Xiamen University, Xiamen, Fujian 361005, China

## HIGHLIGHTS

- More than 70% of the surveyed residents understand the TPHE reform.
- The electricity expenditures of 80% households almost remained constant.
- Households in the third electricity price tier are more sensitive to the price change.
- TPHE helps households to change the inefficient pattern of electricity consumption.
- Income has a significant impact on elasticity of electricity consumption.

## ARTICLE INFO

### Article history:

Received 7 May 2014

Received in revised form 7 July 2015

Accepted 4 August 2015

### Keywords:

Tiered pricing for household electricity  
Residential electricity consumption  
Energy pricing reform

## ABSTRACT

After almost three years of preparation, the tiered pricing for household electricity (TPHE) was implemented across China in July 2012. The feedbacks of household electricity consumption to the new pricing policy are investigated in this paper based on the micro household-level data from China's Residential Energy Consumption Survey (CRECS). We document that electricity consumption of 82% surveyed households did not affected by the TPHE, which is in conformity with the principle that the TPHE policy based on. More importantly, factors that influence elasticity of household electricity consumption are examined by empirical model in this paper. Results indicate that factors such as the energy price, household income, and demographic attributes have significant impacts on residential electricity consumption. Further discussion outcomes show that the publicity of the TPHE, energy price and some other factors are strongly correlated with the probability that households change the inefficient and lavish pattern of electricity consumption. Future directions for the design and improvement of residential electricity pricing reform are thus suggested.

© 2015 Elsevier Ltd. All rights reserved.

## 1. Introduction

Tiered pricing for household electricity (TPHE), the abbreviation of household increasing block electricity tariffs (IBTs) in China, divides household electricity consumption into several blocks and charges higher prices for electricity consumption in higher blocks. The theoretical basis for TPHE in economics is Ramsey

pricing, that is, the TPHE is based on the residential electricity price elasticity. Implementing the increasing block tariffs for residential electricity is conducive to improving the equity and efficiency, and thereby promoting electricity conservation and energy-related emissions reduction [1,2].

In June 2012, the National Development and Reform Commission (NDRC) in China proposed about implementing the TPHE in July 1st. It demonstrated that the central government determined to initiatively promote energy pricing reform. Under this new pricing system, household electricity prices would be set into three tiers based on the volumes of electricity use. In other words, if residential electricity consumption exceeded the certain limit (the baseline), it would be charged a higher price.

The guidance issued by the NDRC encompassed two requirements. First, the reform should ensure that electricity consumption

\* Corresponding authors at: Collaborative Innovation Center for Energy Economics and Energy Policy, School of Economics, Xiamen University, Xiamen, Fujian 361005, China. Tel.: +86 5922186076; fax: +86 5922186075 (C. Sun), School of Economics, Xiamen University, Xiamen, Fujian 361005, China. Tel.: +86 5922180750 (D. Zhang).

E-mail addresses: [cw\\_sun@foxmail.com](mailto:cw_sun@foxmail.com) (C. Sun), [zdz196878@sina.com](mailto:zdz196878@sina.com) (D. Zhang).

**Table 1**  
The TPHE of some provinces in China.

Province	The first block <sup>a</sup>	The second block	The third block
Beijing	≤240 (0.4883 CNY/kW h)	240–400 (0.5383 CNY/kW h)	>400 (0.7883 CNY/kW h)
Tianjin	≤200 (0.49 CNY/kW h)	201–340 (0.54 CNY/kW h)	>340 (0.79 CNY/kW h)
Shanxi	≤170 (0.477 CNY/kW h)	171–260 (0.527 CNY/kW h)	>260 (0.777 CNY/kW h)
Inner Mongolia	≤170 (0.43 CNY/kW h)	171–260 (0.48 CNY/kW h)	>260 (0.73 CNY/kW h)
Jilin	≤170 (0.525 CNY/kW h)	171–260 (0.575 CNY/kW h)	>260 (0.825 CNY/kW h)
Heilongjiang	≤170 (0.51 CNY/kW h)	171–260 (0.56 CNY/kW h)	>260 (0.81 CNY/kW h)
Jiangsu	≤230 (0.5283 CNY/kW h)	231–400 (0.5783 CNY/kW h)	>400 (0.8283 CNY/kW h)
Fujian	≤200 (0.4983 CNY/kW h)	201–400 (0.5483 CNY/kW h)	>400 (0.7983 CNY/kW h)
Shandong	≤210 (0.5469 CNY/kW h)	211–400 (0.5969 CNY/kW h)	>400 (0.8469 CNY/kW h)
Henan	≤180 (0.56 CNY/kW h)	181–260 (0.61 CNY/kW h)	>260 (0.86 CNY/kW h)
Hubei	≤180 (0.57 CNY/kW h)	181–400 (0.62 CNY/kW h)	>400 (0.87 CNY/kW h)
Chongqing	≤200 (0.52 CNY/kW h)	201–400 (0.57 CNY/kW h)	>400 (0.82 CNY/kW h)
Gansu	≤160 (0.51 CNY/kW h)	161–240 (0.56 CNY/kW h)	>240 (0.81 CNY/kW h)
Ningxia	≤170 (0.4486 CNY/kW h)	171–260 (0.4986 CNY/kW h)	>260 (0.7486 CNY/kW h)
Anhui	≤180 (0.5653 CNY/kW h)	181–350 (0.6153 CNY/kW h)	>350 (0.8653 CNY/kW h)
Guizhou	≤183 (0.4556 CNY/kW h)	183–333 (0.5056 CNY/kW h)	>333 (0.7556 CNY/kW h)

<sup>a</sup> Monthly electricity use per household (unit: kW h).

of 80% households would not be affected. Second, the power tariff in the first-tier should remain unchanged, an only the electricity prices in the second tier and the third tier could be increased. The TPHE was then implemented in 29 provinces of China except Tibet and Xinjiang. The local governments were authorized to set up the electricity-price tiers according to the local conditions such as the income level, and temperature. The TPHEs policies of some provinces in China are shown in Table 1.

It is quite common for the general public to question the energy pricing reform in the residential sector, which is closely associated with family lives [3]. Therefore, the reform of residential electricity pricing has become the most sensitive issue in China. The previous residential electricity price, which is lack of transparency and reasonability, is administratively depressed by the central government, and thus is lower than its long run marginal cost [4]. Moreover, the uniform electricity pricing mechanism in the residential sector, which mostly benefits the high-income group rather than the low-income residents, goes against the principles of subsidies-improving the access to modern forms of energy and reducing poverty by providing energy subsidies to the poor, has resulted in excessive electricity consumption and inefficient subsidy allocation.

Therefore, it is critical to investigate whether the energy pricing mechanism has achieved the objectives of efficiency and equity. To better understand how the implementation of the TPHE can affect residential electricity consumption, we document several additional questions. First, using the micro household-level survey data, we show some feedbacks of residential electricity consumption after the implementation of TPHE. Second, we investigate the elasticities of electricity consumption in different blocks, because factors such as whether the TPHE would be supported by households at different income classes and whether the increasing block tariffs have an impact on household electricity consumption behavior depend on price elasticities [3]. Finally, we provide the evidence that the publicity of policy, which means making the policy more well-known, does indeed contribute to promoting households to transform from electricity-intensive consumption pattern to electricity-saving consumption pattern. Together, these findings suggest that policy implications are important for decision makers on further promoting the pricing reform of resource products in the residential sector [3]. Our findings contribute to the literature in terms of the following aspects. First, they provide answers to the above important questions that are valuable to the further energy pricing reform in China. Second, this paper is based on micro household-level survey data that are more informative and time-efficient, and the determinants of elasticity of household electricity consumption are thoroughly investigated.

The remainder of this study is organized as follows. Section 2 presents previous literature. Section 3 provides the description of questionnaires and analysis of survey data. Section 4 discusses the empirical results about the elasticity of household electricity consumption. Section 5 further discusses residential electricity consumption after the TPHE reform. Section 6 provides conclusions and policy recommendations.

## 2. Literature review

Research on the tiered pricing for household electricity mainly focused on two aspects. The first aspect is the public acceptance to the reform. The second aspect is the sensitivity of residents on electricity price changes.

Tiered pricing for household electricity (TPHE) reform is an important tariff policy for household electricity conservation in China. Based on the TPHE, three electricity-price thresholds are proposed, and additional payment will be charged if the household electricity consumption exceeds the upper bound of each threshold. The research of how households are sensitive to the reform of residential electricity pricing is crucial, since the general public tends to question the transparency and reasonability of the reform. For example, Wang et al. [3] conducted a questionnaire survey in four urban cities of China, explored determinants of public willingness to accept TPHE and made out the acceptable range of premium. Besides, after randomly selecting a sample of 816 residents in Beijing, Wang et al. [5] indicated the discomfort caused by saving in household electricity consumption may have the negative influence on the acceptance of policy. Hensher et al. [6] found that willingness to pay is helpful for establishing desired levels of service quality and requisite service targets through a sample of residents in Canberra, Australia. Erdogdu [7] analyzed the impacts of electricity market reform by panel data of 63 countries during 1982–2009. Without a doubt, the efficiency of the TPHE policy is important for reducing energy consumption. Wang et al. [8] showed that the rebound effect could significantly weaken the effectiveness of policies, and Chinese government should take the rebound effect into consideration when formulating energy policies. Nie and Kemp [9] conducted a decomposition analysis of changes in energy consumption through households' energy-using activities using data from the China Statistical Yearbook and China Energy Statistical Yearbook in the period 2002–2010. Davoudpour and Ahadi [10] found that if the energy carriers' price was increased to border price and energy efficiency programs were implemented, they would lower the growth rate of CO<sub>2</sub> emissions. Xu and Chen [11] believed that in the electricity reform, China

Download English Version:

<https://daneshyari.com/en/article/6685901>

Download Persian Version:

<https://daneshyari.com/article/6685901>

[Daneshyari.com](https://daneshyari.com)